46059

p. 49

(NASA-TM-110574) CONTINUAL
IMPROVEMENT PLAN (NASA) 49 p

N95-25849

Unclas

63 /81 0046059

CONTINUAL IMPROVEMENT

PLAN

August 1994

PREFACE

NASA's Continual Improvement (CI) Plan was sponsored by NASA's Quality Steering Team (QST) and developed by a diverse team of employees and managers from across NASA.

The CI Plan and NASA's Strategic Plan were developed simultaneously with the intention of aligning the CI Plan goals with the Strategic Plan. The CI Plan provides a road map to ensure full achievement of the continual improvement operating principle cited in the Strategic Plan.

J. R. Dailey
Acting Deputy Administrator

INTRODUCTION

NASA's approach to continual improvement is a systems-oriented, Agencywide approach that builds on the past accomplishments of NASA Headquarters and the Field Installations and helps achieve NASA's vision, mission, and values. The NASA of the future will fully use the principles of continual improvement in every aspect of its operations.

This NASA CI Plan defines a systematic approach and a model for continual improvement throughout NASA, stressing systems integration and optimization. It demonstrates NASA's constancy of purpose for improvement--a consistent vision of NASA as a worldwide leader in top-quality science, technology, and management practices. The CI Plan provides the rationale, structures, methods, and steps, and it defines NASA's short-term (1-year) objectives for improvement. (Midterm and long-range implementation goals will be derived from the results of a CI External Assessment initiative.) The CI Plan presents the deployment strategies necessary for cascading the goals and objectives throughout the Agency. It also provides guidance on implementing continual improvement with participation from top leadership and all levels of employees.

This Plan is designed to assist NASA managers and employees at all levels in integrating continual improvement into everything NASA does, including design, development, planning, source selection, procurement, research, technology, manufacturing, science, space flight, support services, and internal operations.

Much of the current reinvention activity within the Government is based on the work of Dr. W. Edwards Deming, quality expert. NASA's systems-oriented approach to CI is derived from Dr. Deming's teachings. Dr. Deming's work describes an example of a system well optimized as...."a good orchestra. The players are not there to play solos as prima donnas, each one trying to catch the ear of the listener. They are there to support each other. Individually, they need not be the best players in the country." [1] NASA's CI approach will assist the Agency in operating as a well-integrated system of programs and functions.

Continual Improvement

Continual improvement, or Total Quality Management (TQM), is a collection of sound management and business practices that focus on processes and common causes of process failure rather than on problems and symptoms. Customer needs and expectations drive the system. By using a Plan, Do, Study, Act (PDSA) approach, processes are systematically analyzed and continually improved, all with a focus on customer requirements.

---

[1] W. Edwards Deming. <u>The New Economics For Industry, Government, Education.</u> Massachusetts Institute of Technology, 1993. pg. 99

The use of "continual improvement" encompasses both Kaizen, or gradual improvement efforts, and breakthrough improvements, such as quantum leaps through innovation and reengineering (See chapter 5). Dr. Deming used the term "continual" improvement rather than "continuous" improvement. Graphically, continuous improvement would appear as a smooth arc. However, few organizational improvement efforts would appear as smooth ascending lines if shown graphically.

Continuous   ## Continual
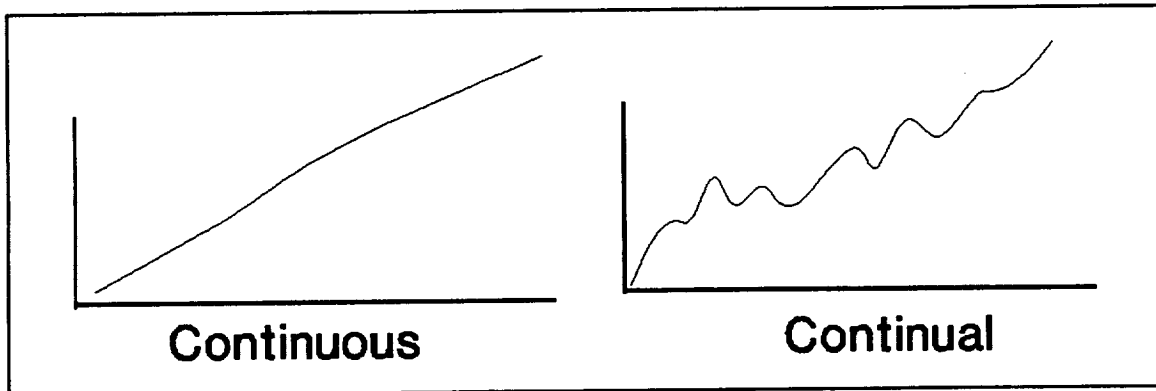
NASA's QST endorsed the overarching term of "continual" since it is a more accurate depiction of the surges and plateaus that all organizations experience.

Approach to Plan Development

NASA's CI Plan is based on the Malcolm Baldrige National Quality Award criteria. The criteria are divided into seven areas, as follows, Leadership, Information and Analysis, Strategic Planning, Human Resource Development and Management, Management of Process Quality, Quality and Operational Results, and Customer Focus and Satisfaction. Because NASA needed to focus on its suppliers, an eighth category of "Supplier Quality" was added. The goals in each of the eight chapters will help the Agency move toward a state of excellence in each key area and ultimately to an overall state of excellence for the Agency. The model is shown in the following figure:

NASA Continual Improvement Plan
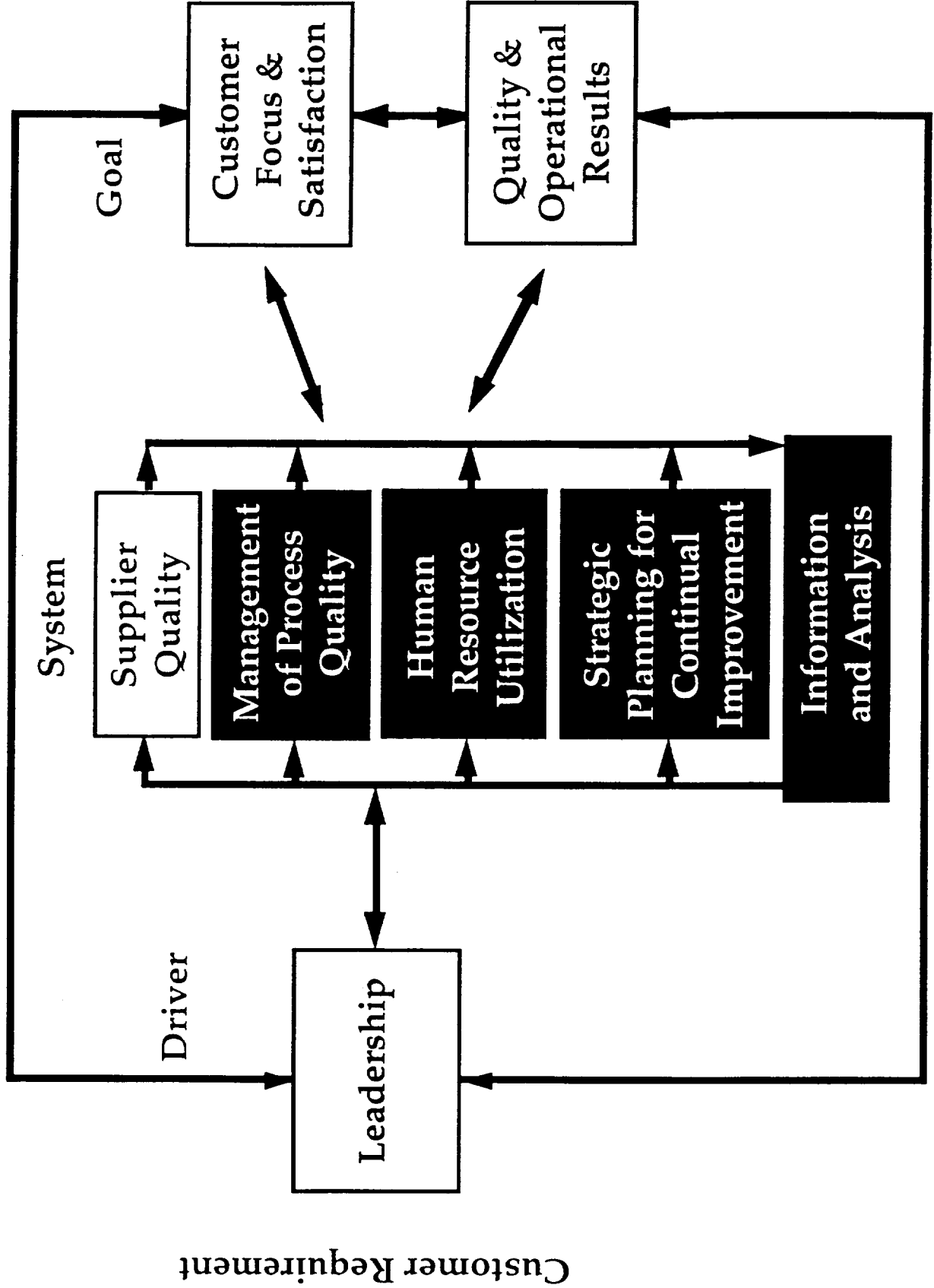
Framework for Change

Customer Focus & Satisfaction

Quality & Operational Results

Goal

System

Supplier Quality

Management of Process Quality

Human Resource Utilization

Strategic Planning for Continual Improvement

Information and Analysis

Driver

Leadership

Customer Requirement

TABLE OF CONTENTS

8.0 CUSTOMER FOCUS AND SATISFACTION

x

1.0 LEADERSHIP FOR QUALITY

1.1 Purpose

Strong and supportive leadership is key to organizational transformation. Senior management will provide the leadership for quality at NASA. This chapter defines the leadership roles and behaviors of senior management in developing and communicating quality through personal and visible commitment.

1.2 NASA Vision and Quality Values

The NASA Vision is driven by these Quality Values:

- Leadership
- Continual Improvement
- Customer Focus
- Empowerment
- Achievement
- National Stewardship

1.3 Understanding The Present NASA Environment

> *The significant problems we face today cannot be solved at the same level of thinking we were at when we created them.*
> Albert Einstein

To understand NASA's present environment, one must first understand where NASA has been. NASA is an organization with a nearly mythic past. This Agency took the first and only humans to the Moon. During the Apollo program, NASA acquired a deserved reputation for technical and managerial excellence, and many of the management techniques developed to guide that effort were subsequently adopted by other large engineering and production organizations. NASA's pride in its past is justified.

NASA has also been a leader of change. Now, the Agency must recognize and understand changes in budgets, programs, operations, and the expectations of NASA by the American public.

The NASA System

Defining the NASA system, customers, and suppliers is an important component of charting the Agency's future. An Input/Output (I/O) analysis is an important first step for any continual improvement effort. Such an

1

analysis identifies customers, outputs (i.e., products and services), inputs, suppliers, and associated processes.

INPUT/OUTPUT MODEL

ENVIRONMENT

SUPPLIERS   CUSTOMERS

| 3RD TIER SUPPLIER | 2ND TIER SUPPLIER | PRIME SUPPLIER | N A S A | IMMEDIATE CUSTOMER | INTERMEDIATE CUSTOMER | ULTIMATE CUSTOMER |
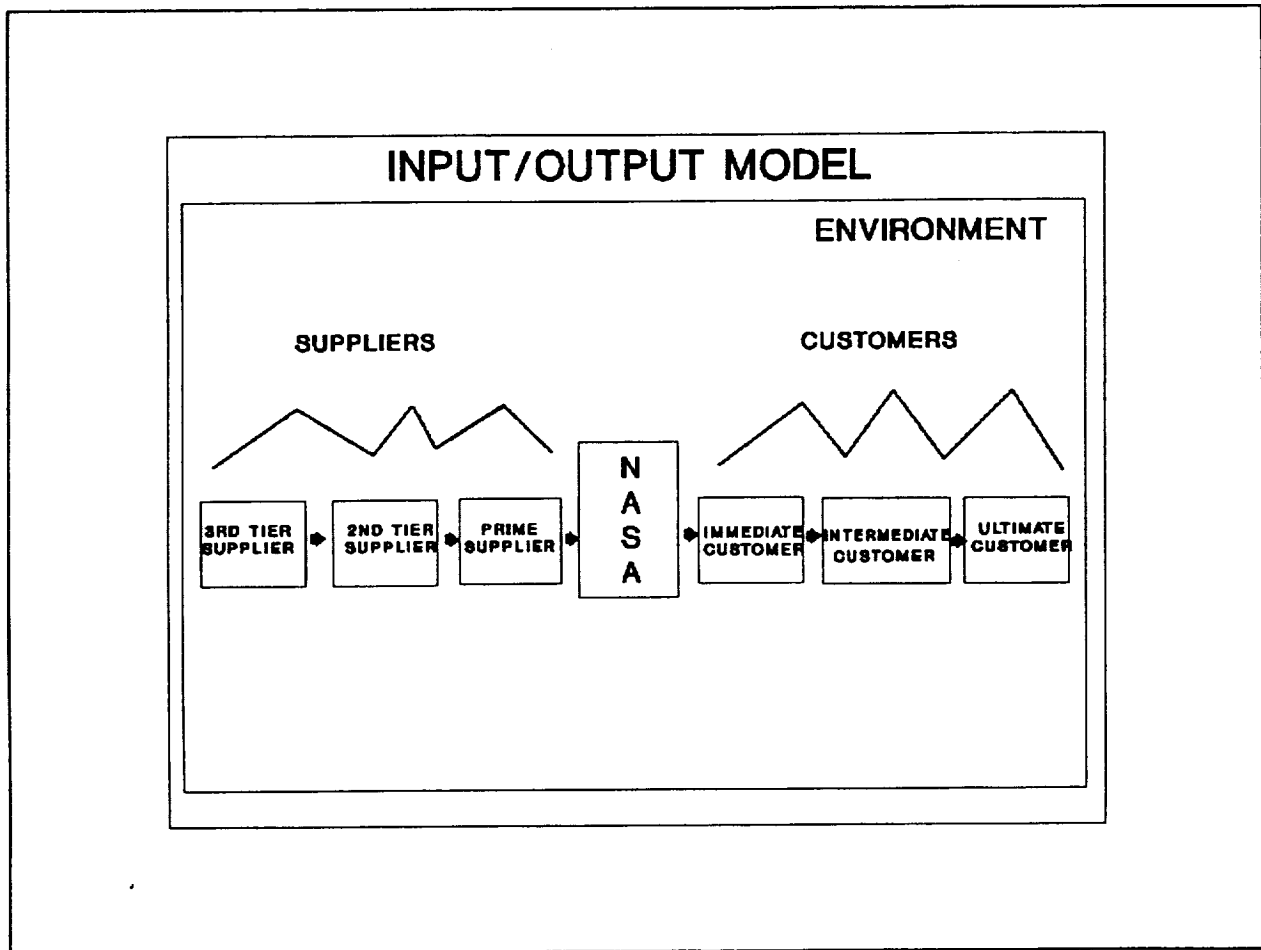
Leadership for Quality

Senior managers will be visibly and personally involved in the development of an effective quality culture. They will provide a clear definition of what quality means at NASA and use that definition in all decisionmaking and management activities. NASA leadership will demonstrate quality principles in managing the Agency and in interactions with those outside the Agency.

1.4   Development of Leadership for Quality at NASA

To prepare NASA's senior management to lead the continual improvement effort, quality-related education and training courses are planned. Senior managers already have attended seminars and workshops by Dr. Deming, Dr. Joseph Juran, Dr. Moshe Rubenstein, and other quality experts.

Demonstrate Leadership for Quality

> *"What you are speaks so loudly that I cannot hear what you say."*
>
> Ralph Waldo Emerson

NASA management will lead by example. As leaders, senior management will:

- Empower people to make decisions.
- Be open-minded.
- Be sensitive to the needs of people around them.
- Be accountable.
- Create and support an environment that brings out the best from the Agency's most important resource and asset - its people.

The NASA Quality Steering Team and Quality Councils

NASA's leadership structure for quality is comprised of the QST and the Headquarters and Field Installations' quality councils.

The QST was chartered by NASA's Administrator to guide the continual improvement process. The QST is a subset of the Senior Management Group (SMG), and it is comprised of both permanent and rotating members. The QST guides the development of the CI Plan and the CI External Assessment, sponsors NASA's excellence award and Quality Conference, and establishes Quality Management Boards (QMB's) and Process Action Teams (PAT's). The QST will guide the annual updates of the CI Plan, develop outyear goals and track progress against goals, support the biannual continual improvement assessment process, link strategic management with the CI Plan, and initiate ongoing continual improvement activities.

Integrate Quality Principles

By developing an integrated systems approach to management, quality principles and values will be established as the way of doing business at all levels of NASA. NASA leadership, in cooperation with appropriate employee representation, will use quality principles and values to guide planning and decisionmaking.

Develop, Deploy, and Continually Improve the CI Plan

NASA's leaders will review and endorse the CI Plan, create appropriate, linked structures/mechanisms to plan and evaluate progress, continually improve the Plan through annual assessments, and effectively deploy the Plan to all levels of the Agency through communication and quality actions.

Demonstrate Public Responsibility

NASA has a responsibility to the people of the United States to be accountable for the public trust while ensuring the future of the American aeronautics and space program.

All NASA installations will continue to demonstrate environmental citizenship with programs that address the local and national environmental and wildlife issues.

NASA will continue to provide speakers for major quality conferences, academic events, and professional societies, and to host international visitors. Educational partnerships will provide the link with educational institutions.

1.5   Creation of Environment for Change

NASA's senior managers will create an environment where people have the desire, the will, and the opportunity to perform with a level of excellence that honors and serves customers, both internal and external.

NASA management has chosen to incorporate its reinvention activities, as required by the National Performance Review (NPR), under the stewardship of the QST.

Show Visible Support

Senior managers will play an active role in removing barriers to continual improvement. The environment, set by senior management, will empower the NASA team to take risks, learn from mistakes, and identify solutions. Fear and apprehension will be eliminated. Responsible decisionmaking will be based on reliable data and information. Senior managers will be accountable and responsible for achieving clearly defined continual improvement goals. NASA's senior managers will establish the foundation for change.

Provide Resources

Senior management must be willing to invest in NASA's future. This investment includes commitment to teaming, people and funding, sufficient education and training to effect change, long-range planning for clear vision and mission, and the development and deployment of strategic goals and objectives.

1.6   1-Year Goals

1.1   Provide a minimum of 12 hours of standardized TQM/CI education and training to all SES-level senior managers (Codes F, T, all SES; October 1, 1994).

1.2   Develop appropriate top-level I/O analyses which identify customers, products/services, inputs, suppliers, and associated processes (QST and Strategic Enterprises; December 1994).

1.3.   Give presentations at key quality events (Selected senior managers; April 1995).

2.0 INFORMATION AND ANALYSIS

2.1 Purpose

The continual improvement management and decisionmaking process is based on facts obtained from measuring processes, performance, and customer satisfaction. Reliance on intuition or single data points is reduced or eliminated. This chapter defines approaches for using information to drive process, performance, and customer satisfaction improvement throughout the Agency.

2.2 Data and Information Management

Data and information will be collected and analyzed to provide NASA management with information on process, performance, and customer satisfaction. Steps will be taken by senior management to ensure that data are collected and analyzed in methodologically correct ways. We recognize that the mathematical basis of continual improvement is statistical or probabilistic and has its roots in the work of Walter Shewhart. We also recognize the critical importance of the use of operational definitions.

Types of Data

Three types of data/metrics will be routinely collected and analyzed to provide a comprehensive assessment of NASA's efforts.

Customer metrics focus on how well NASA meets customer requirements and satisfies customers. These are the most important metrics, and they will drive action planning at NASA. (Customer focus and satisfaction are covered in detail in chapter 8.)

Performance metrics focus on results. They serve to communicate the overall status of the Agency to its customers, provide historical indicators and trends of Agency performance, evaluate performance trends, and provide insight into opportunities for process improvement. Examples include cost, schedule, and technical accomplishments.

Process metrics are measures of an ongoing process for the purpose of monitoring and improving that process. A process should first be understood before it is improved. Once the process is documented, key indicators defined by internal and external customers should be used as a basis for measurements. Tracking a process over a period of time assists in problem identification and root cause determination. (See chapter 5).

Performance planning will incorporate the measures and measurement systems developed to support implementation of the Government Performance and Results Act (GPRA).

Senior management will ensure that the data are collected and analyzed correctly, and that mechanisms are developed to feed data directly into management actions, the NASA Strategic Plan, and the CI Plan.

Criteria for Selecting Areas of Measurement

NASA's senior management will select key areas in which to collect and analyze data. A major basis for this decision will be Administration and congressional requirements, particularly reinvention activities generated by the NPR. The Administrator's Performance Agreement with the President will be a major criterion. The selection of these key areas will be based on importance to NASA's customers, relevance to NASA's mission, importance to NASA's internal operations, and impact on cost, schedule, and technical accomplishments.

Current Metrics Activities

The NASA-wide Metrics Process Action Team (MPAT) was chartered to develop a set of measures to communicate NASA's performance to external customers. The MPAT has developed a set of ten Metric Subject Areas (MSA) determined to be important to NASA's external customers (See chapter 7). One example is program performance metrics, such as cost, schedule, and technical accomplishments. The MPAT has developed a standard process and format for collecting and displaying these Agencywide metrics. The format will be disseminated to encourage standardization of this approach.

The MPAT will issue a semiannual report with updates on all data in the ten MSA to all of NASA's senior management. NASA's senior management will then disseminate this information, internal and external to the Agency.

The Contractor Metrics Process Action Team (CMPAT) has developed metrics for NASA's major contractors. The metric areas include cost, schedule, technical performance, safety, subcontracting, award fees, and continual improvement. The CMPAT will provide periodic updates of the data to NASA's senior management.

2.3   Analysis and Use of Data

The use of data is key to the continual improvement process. Data, properly analyzed and disseminated, provides information needed for identifying and

developing solutions to customer problems, determining key customer trends, decisionmaking, long-term strategic planning, and continual improvement.

Senior management will be actively involved in developing high-level goals, which will be cascaded to all levels of the organization. Goals will be tied directly to customers' needs and expectations, NASA's mission, and NASA's Strategic Plan (See chapter 3). Measures will be developed based on the criteria in section 2.2, and performance and processes will be analyzed using proven statistical tools.

Continual improvement requires an up-front investment. In identifying performance metrics, special attention will be paid to those metrics that indicate sound financial planning and execution, as well as those metrics that indicate a link between resources used and successful mission performance. The GPRA makes that link explicit.

2.4 Benchmarking

Benchmarking is a process of continually comparing and measuring an organization against business/Government leaders to gain information that will help the organization take action to improve its performance. Benchmarking and other comparative analyses will facilitate incremental and breakthrough improvements in NASA's own work processes, products, and services.

Benchmarking benefits NASA through:

- Accelerating the process of change by adapting process improvements and best practices of organizations which are recognized for excellence.
- Encouraging excellence, breakthrough thinking, and innovation.
- Achieving both incremental and breakthrough improvements in products, services, and processes.
- Improving customer satisfaction by improving the organization's products and services.
- Emphasizing changing customer needs.
- Developing realistic stretch goals and strategic targets.
- Providing a sense of urgency for improvement and a picture of the potential result from change.
- Creating a better understanding of competitors and the dynamics of the industry.

The most powerful use of benchmarking is to integrate and align NASA's ongoing reinvention initiatives, continual improvement efforts, and strategic planning.

Criteria for Selection of Benchmarking Activities

In determining areas for conducting benchmarking, the following selection criteria will be considered:

- Important to implementing reinvention activities at NASA as defined by the NPR recommendations, Executive orders (EO), Presidential memoranda (PM), etc.
- Important to NASA and its customers.
- Strong corporate linkage to customer satisfaction.
- In alignment with NASA's Strategic Plan goals and the Administrator's Performance Agreement.
- Provides clear benefits to the Agency.
- Affordable and cost-effective.
- Improves competitive posture.

2.5 1-Year Goals

2.1. Establish a program to coordinate NASA's benchmarking efforts (Code T, QST; December 1, 1994).

2.2. Align Agency-level performance metrics with the Strategic Plan (SMG, MPAT; April 1, 1995).

2.3 Complete pilot phase of MPAT in a methodologically sound manner (MPAT; April 1995).

2.4 Decide how to disseminate MPAT data, internal and external to the Agency (SMG, MPAT; April 1995).

3.0 STRATEGIC PLANNING FOR CONTINUAL IMPROVEMENT AND NASA REINVENTION

3.1 Purpose

A clear and consistent NASA CI Plan, linked to the NASA Strategic Plan and Strategic Management Plan and deployed throughout the organization, will contribute to the desired transformation of NASA. This chapter defines the process for establishing and deploying continual improvement policies, and short- and long-term continual improvement goals throughout the Agency.

3.2 Roles and Responsibilities

NASA's SMG, through the QST, is responsible for developing and deploying continual improvement policy, plans, principles, and goals, as well as NASA reinvention activities resulting from the NPR (See appendix for QST charter). It is also responsible for evaluating progress on continual improvement and NASA reinvention. To achieve these objectives, the QST will use the continual improvement cycle of PDSA.

3.3 Methodology for Plan Development (PLAN)

The QST is responsible for the development of the NASA CI Plan. Resource teams, consisting of employees representing a cross section of NASA Field Installations and Headquarters codes and functioning under the leadership of the QST and other senior managers, will support the development of specific chapters and requisite customer-driven continual improvement goals.

These resource teams will employ continual improvement principles of operation. NASA's Office of Continual Improvement is responsible for coordinating the development, dissemination, and continual improvement of the CI Plan. Periodic reviews by representatives from Field Installations and Headquarters codes will ensure continuity, consistency, and clarity. Upon the recommendation of the QST, the CI Plan will be briefed to the remainder of the SMG, and to the NASA Administrator for final approval.

The QST will use the QST-SMG partnerships to ensure that the remainder of the SMG is advised of plan development and feels a sense of ownership of the plan.

The CI Plan will be compatible with and responsive to NASA's Strategic Plan and Strategic Management Plan.

NASA's Field Installations' and Headquarters codes' continual improvement structures will ensure that their individual CI Plans are supportive of and consistent with the Agencywide CI Plan. Agency continual improvement goals will cascade throughout NASA, resulting in alignment.

The QST will ensure that quality policies are adopted, communicated, and executed by explicit links to other appropriate management forums and by sub-groups established for this purpose, e.g., the Education and Training Quality Management Board (E&TQMB) and the Customer Standards Steering Group. (The latter was established by the QST to implement the requirements of EO 12862, Setting Customer Service Standards; see chapter 8.)

3.4   Continual Improvement Goal Development

Continual improvement goals are properly an extension of the Agency's strategic goals. The continual improvement goals will be:

- Aligned with the White House's reinvention initiative for NASA.
- Realistic.
- Set by those involved in the process.
- Clear and easy to understand.
- Translatable into measurable strategies or objectives.
- Derived from and supportive of NASA's strategic goals.
- Consistent with NASA's mission, vision, and values.
- Supportive of higher level goals.
- Directed at meeting the needs of customers and suppliers.

Goal deployment will be accomplished using a cascading process, flowing down through NASA's organizational structure. The further down in the organizational structure, the more specific the goals should be.

All operational plans will contain continual improvement objectives. The QST is responsible for linking continual improvement goals with NASA's strategic planning process.

3.5   Deployment of the CI Plan   (DO)

To institutionalize continual improvement, the CI Plan's requirements will be disseminated to NASA's customers, as well as to NASA's employees and suppliers. The Plan and associated goals will clarify NASA's continual improvement priorities and will be fully integrated with overall Agency strategic planning and budgeting processes to ensure appropriate allocation of resources.

NASA's senior management will provide the framework for deployment by articulating the vision and quality values and by allocating resources. Within this framework, every level of the Agency will contribute to, and be responsible for, continual investigation, definition, and fulfillment of the Plan's goals. Field

Installations' and Headquarters organizations will align their continual improvement goals with those developed by the Agency, and cross-functional requirements will be deployed with optimal cooperation and coordination and, where appropriate, will utilize existing cross-functional continual improvement teams to assist in deployment.

To institutionalize NASA's continual improvement philosophy and methodology, the Agency will:

- Develop an integrated systems approach to management.
- Establish continual process improvement as a way of doing business.
- Assess itself and learn from this assessment.
- Review, evaluate, redefine, and update the CI Plan to coincide with the Agency's strategic plan.
- Focus on teaming as the principal method to address complex problems.
- Devote time and resources to allow individuals and teams to propose organizational requirements from the bottom up and to build specific objectives to align themselves with the organization's goals.
- Use metrics as a tool to enhance team functions and not for control purposes.
- Orient performance plans toward success based on individual contribution to team achievement.
- Develop sensitivity to customers by conducting an external assessment on a biannual basis.
- Provide consistent education and awareness training and resources to effect optimum intraagency working relationships and deployment.
- Develop a continual improvement research and development program to advance continual improvement state of the art at NASA.

3.6   Continual Improvement Monitoring   (STUDY)

The QST will systematically review NASA's progress toward continual improvement goals no less than semiannually. Results will be widely disseminated to employees, customers, and suppliers.

A related monitoring mechanism is the NASA Reinvention Management Information System (RMIS), which tracks Agency progress on reinvention activities.

To obtain an external perspective of NASA's progress in its continual improvement efforts, a 2-year assessment cycle will be used. Evaluations will be provided by certified evaluators, external to the NASA community. These evaluators will conduct onsite assessments and provide a written report to the Agency. The report will be used to identify strengths and opportunities for improvement. It will also provide a baseline for measuring future progress. NASA's Office of Continual Improvement will design the assessment procedure with input from Field

Installations and Headquarters codes. The first biannual review will be accomplished in 1994.

3.7 Institutionalize (ACT)

The QST, in conjunction with the SMG, is responsible for institutionalizing those parts of the CI Plan that are found to be successful and for initiating new PDSA cycles for those that are not.

3.8 Methodology Improvement

The current CI Plan and associated goals, as well as the development methodology, will be reviewed annually by the QST. These evaluations will include feedback from NASA's suppliers, employees, and customers. Based on this review, the CI Plan and goals will be updated.

3.9 1-Year Goals

3.1   Issue this first CI Plan (QST, SMG; August 1994).

3.2   Institutionalize a process for installation Quality Councils to forward issues and obstacles to the QST (QST; October 1994).

3.3   Formally charter at least one Agency Quality Management Board and process action team to serve as the first exemplary effort to execute continual improvement at NASA (QST; October 1994).

3.4   Develop and sign the Administrator's Performance Agreement with the President. Use this agreement as one source of input into SES performance objectives for the next cycle (FY 1994-95). (Administrator, Codes A and T; October 1994).

3.5   Update the CI Plan, using the results of the External Assessment, as part of the PDSA Cycle (QST; April 1995).

3.6   Create appropriate linkages to other groups and structures to enable deployment of the CI Plan and associated NASA reinvention activities (Code T, QST; April 1995).

3.7   Explicitly connect the NASA reinvention activities, as described in the RMIS, to the next revision of the CI Plan (QST, Code T; April 1995).

3.8   Review progress against the goals in the CI Plan (QST; November 1994 and April 1995).

4.0 HUMAN RESOURCE UTILIZATION

4.1 Purpose

This chapter defines plans to optimize the development, deployment, and management of NASA's human resources by achieving a workplace environment that provides challenging tasks and career opportunities, recognizes and values diversity, encourages risk-taking, practices empowerment, and ensures a professional environment for all.

4.2 Human Resource Management

NASA's human resource management system will be aligned to support the goals outlined in NASA's Strategic Plan and the requirements of NASA's reinvention initiatives. Within the constraints of streamlining mandates, recruiting initiatives will be geared to attracting culturally diverse personnel who value the opportunity to apply their skills, knowledge, and abilities within a working environment oriented to risk-taking, teamwork, empowerment, and excellence in customer service/satisfaction. Organizational redesign and employee empowerment will both be pursued in accordance with a "loose-tight" organizational model. This means certain functions, such as setting policy, are highly centralized, while others, such as procedural aspects of project management, are highly decentralized.

Teamwork and cooperation at all levels will enable NASA to provide the highest quality products and services, leading to superior customer satisfaction.

NASA will strive for flexibility in position management and classification and will work with the Office of Personnel Management to effect changes in the position management and classification system in a manner that supports continual improvement. The Agency will engage in continuing efforts and actions to ensure that staff promotion criteria emphasize commitment to continual improvement principles and practices.

NASA will pursue regulatory and statutory exemptions or revisions to Federal processes if they unnecessarily restrict our human resource management goals.

Continual improvement terminology, tools, and techniques will become common across NASA and/or the Federal Government. Commonality will improve communication through common understanding of terms and concepts and make more effective use of resources.

4.3 Employee Involvement

Successful pursuit of continual improvement objectives is highly dependent upon fully utilizing the NASA workforce skills and energies. All employees will be afforded opportunities to innovate, suggest, and participate in improvement projects. NASA will establish an environment that advocates and promotes

empowerment, responsibility, and innovation. NASA will also foster a working environment in which barriers to empowerment, responsibility, and innovation are identified and actively removed. NASA will eliminate barriers to identifying good ideas by creating integrated support teams from various disciplines (budget, program management, engineering, science, human resources, etc.) and by continued use of process improvement teams.

4.4   Employee Education and Training in Quality

The QST is committed to building an internal organic training capability, lessening dependence on procurement of external resources over time. NASA will train instructors and buy rights to use materials NASA-wide. A strong internal capability will expand application of continual improvement tools and concepts and reduce costs. To develop options for proceeding, the CI Resources Subcommittee of the QST will ensure that best practices are benchmarked and used as a basis for recommending options for proceeding in the design of this educational capability.

The E&TQMB, which reports to the QST, serves as an Agency-level forum to identify and articulate NASA continual improvement education and training requirements and opportunities. The QST will develop overall policy and serve as the guidance team for the E&TQMB. The E&TQMB will develop a process for screening, selecting, piloting, and evaluating continual improvement education and training. The E&TQMB will also recommend sources and sequential continual improvement education and training opportunities to serve the best interests of the Agency and work toward a long-range strategy of self-sufficiency.

The E&TQMB, in collaboration with the NASA Installation Training Officers, Center CI Focal Points, and the Headquarters Code Quality Advisors (CQA's), will participate in building the NASA continual improvement capability and will facilitate a sharing of experiences to identify strengths and weaknesses of continual improvement programs, consultants, and curricula.

4.5   Employee Recognition and Performance

Recognition and Awards

NASA's recognition and awards programs will be designed and developed to ensure alignment with continual improvement and reinvention principles and to improve the effectiveness and efficiency of NASA's operations by stimulating and recognizing employee performance. Emphasis will be placed on reinforcing these principles by recognizing cost-effective efforts consistent with customer service, continual improvement, empowerment, and other total quality environmental factors. Both individual and team accomplishments will be recognized, but emphasis on team achievement will be increased over current levels.

Performance Measurement

Current performance measurement processes and procedures will be reexamined and altered, as appropriate, to emphasize quality, quantity, customer focus, and cost-effectiveness based on work planning expectations and evaluation. Communication will also be emphasized via continuous feedback between supervisor and employee. The inclusion of quality-related criteria and recognition will be included in SES performance plans, especially those of the SMG and the QST.

4.6   Employee Well-being and Morale

Our most valuable resource is people. The individuals who practice human resource management will regard all of the men and women who make up the NASA family as primary customers and adopt the objective of achieving customer satisfaction. NASA management will ensure that each NASA employee becomes the best that he or she can be and has the opportunity to participate in process improvement initiatives.

NASA will strive to provide its employees with the quality work space, equipment, and facilities required to accomplish their jobs. Appropriate modification will be made to accommodate persons with disabilities. Participation in Agency and employee-sponsored wellness programs will be encouraged. In addition, in response to the recent Presidential memorandum on the subject of Expanding Family-Friendly Work Arrangements in the Executive Branch, the Agency will support flexible work schedules to help employees balance both their professional and personal requirements.

Key indicators of well-being and satisfaction will be developed by senior management with input from the NASA workforce. NASA will compare its activities with those of other Government Agencies and industry to identify strengths and opportunities for continual improvement.

4.7   Collaboration, Cooperation, and Integration

The QST and the NASA installation quality councils will ensure appropriate attention to cross-functional team activities. This includes identification of issues, team member selection, needed education and training, resources, and review of progress and recommendations. The QST will ensure that issues and obstacles beyond the authority of Field Installations can be forwarded by their councils to the QST. The QST will utilize resources such as the Center CI Focal Points and Headquarters CQA's as sources of expert assistance.

Support for Agencywide teams will include appropriate education and training of teams and line management, use of trained facilitators strategically placed throughout the organization, and effective allocation of resources (people, funds, and time). Standardization of terminology, use of electronic bulletin boards, and

use of tools such as flowcharting and Statistical Process Control (SPC) software will become standard operating procedures.

4.8   Labor-Management Partnerships

NASA recognizes the importance of establishing and maintaining effective partnerships with various employee groups, including unions. To maximize the success of NASA's continual improvement activities, all NASA installations will proactively coordinate with bargaining units as directed in EO 12871, Labor-Management Partnerships.

4.9   1-Year Goals

4.1   Send a carefully selected group to Federal Quality Institute (FQI) Conference (Chief Operating Officer (COO), QST, Code T; July 1994).

4.2   Provide requisite training support to the reengineering teams established by the Administrative Issues Group (QST, Codes J, F, and T; February 1995).

4.3   Develop an Agencywide continual improvement/reinvention training plan (Codes T, F, and E&TQMB; April 1, 1995).

4.4   Develop sufficient QST expertise in the seven Baldrige categories (eight Plan categories) so that QST members can lead the task teams to revise the Plan (Each QST member; April 1995).

4.5   Develop a plan for initiating labor-management partnerships at each NASA Field Installation per EO 12871 (Each NASA Field Installation, Code F; April 1, 1995).

4.6   Monitor the implementation of the Agency streamlining plan to properly align the Agency's resources and programs with Presidential and congressional directives (Code F, SMG, QST; ongoing to April 1995).

4.7   Execute the Governmentwide "basic training" for all NASA employees, beginning with the SMG; identify and train a cadre of instructors (QST, Codes F and T; 1/2 of workforce to be trained by April 1995).

5.0 MANAGEMENT OF PROCESS QUALITY

5.1 Purpose

Managing process quality ensures continual improvement in process effectiveness and efficiency through the use of systematic methods. This chapter outlines the management of process quality.

5.2 Understanding Systems and Identifying Processes

Work processes do not exist in isolation, but rather as components of larger sub-systems and systems, some of which are extremely complex. In order for continual improvement activities to be effective, they must contribute to the optimization of the overall organizational system, in this case NASA, rather than optimize a particular process, unit, or enterprise and suboptimize the overall organization. Therefore, the relationship of an individual work process to other work processes in the system must be identified and analyzed. Otherwise, what may be an improvement for one work process may actually be a detriment to total system performance.

Every task performed by NASA, from opening and distributing office mail to designing and launching spacecraft, is part of one or more processes. Process identification is the essential first step in management and improvement of process quality. Process identification and definition is accomplished by an indepth I/O analysis. Activities associated with understanding a process include identifying the following:

- Process boundaries.
- Process owner(s).
- Customer(s) of the products or services that are produced.
- Supplier(s) of all required inputs.
- Major steps and flow within the process.
- Interfaces with other processes.

5.3 Process Prioritization

The QST will develop guidelines to prioritize processes for improvement. Priorities will be based primarily on data from key customers identified in the I/O analysis (See chapter 1). This is required by EO 12862, "Setting Customer Service Standards." Priorities will also be based on requirements of the Administration, such as the NPR recommendations, well-defined goals and objectives derived from the Strategic Plan, and input from the managers and employees throughout the organization who see targets of opportunity. Prioritizing processes enables the organization to develop and implement process management approaches, using tools and techniques in an orderly fashion, so that initial efforts are concentrated on those processes most critical to organizational performance.

5.4   Improving and Managing Processes

NASA managers will develop a process improvement system which will use the PDSA cycle:

- Identify customer-and-supplier requirements and expectations, i.e., measure the voice of the customer.
- Establish process objectives and goals.
- Determine the quality characteristics of the process and the outcomes.
- Identify a set of process and performance measurements.
- Define and analyze the existing process, i.e., measure the voice of the process, using problem-solving approaches and data-based tools and techniques to identify special and common causes of process variation.
- Determine if the process is in a state of statistical control, and, if it is not, bring it into a state of statistical control.
- Identify and implement improvements.
- Measure and validate improvement results.
- Institutionalize improvements and ensure ongoing mechanisms are in place to support continual process improvement.

A powerful tool for developing and verifying process improvements and elimination of special cause variation is root-cause analysis. The focus of such an analysis is the development and implementation of fundamental process improvements dedicated to prevention of recurrence.

Sometimes, improvements in a process controlled in a small organization can be implemented without a formal team structure, although the statistical tools are still needed. However, when processes cross organizational lines, a process perspective needs to be developed so that overall improvement, in terms of meeting external customer requirements, takes precedence. This requires forming a process action team with representation from the process owner(s), all the organizational units playing a role in the process, the organization(s) affected by the process, e.g., suppliers and customers, to ensure fostering the best understanding of the process, the best improvement ideas, and ownership so that the solutions will be implemented. Storyboarding will be used as a method of organizing and communicating process improvement activities.

NASA will explore the expansion of reinvention laboratories that will make processes better, faster, and cheaper while ensuring safety and improved customer service.

NASA management, under the leadership of the QST, will demonstrate commitment to process improvement by initiating QMB's and PAT's, forecasting their resource needs at least annually and providing necessary resources, and inviting senior Administration officials to speak at NASA to encourage reinvention

and continual improvement, as well as to share the Administration's vision and the means to reach it.

Incremental Improvements (Kaizen)

Process improvement in small incremental steps, Kaizen, is achieved by a thorough understanding of the process, using a relationship flowchart. Continual improvement can be achieved in small segments; reviews will be ongoing. Kaizen can and does result in great improvements due to the large volume of small improvements applied.

Major Breakthroughs (Reengineering)

Reengineering involves an extensive process redesign or overhaul in the way that existing work is accomplished. It involves rethinking the organizational paradigms that govern the course of the work. It is usually best applied when looking at a system of processes. Reengineering will be considered, if an existing process continues to produce undesired products or levels of efficiency, even after repeated incremental improvements have been implemented. Reengineering may also result from benchmarking a similar process in another organization. The figure below shows that process improvement can occur anywhere along this dimension.

CONTINUAL IMPROVEMENT

Kaizen   **Reengineering**
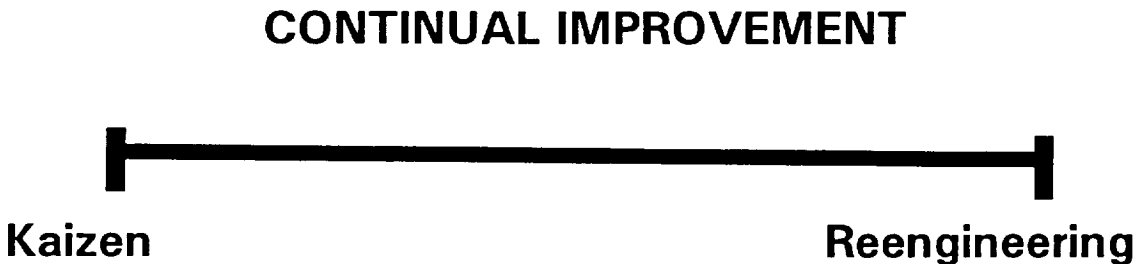
5.5   Developing New Processes and Products

There are usually fewer constraints on designing new processes and products than on improving existing ones. This will provide a unique opportunity to develop processes of high quality at the very beginning using the PDSA cycle as described in 5.4. Tools that are especially useful in addressing new processes and products include concurrent engineering (e.g., integrated product teams) and quality function deployment. Use of these approaches will be expanded at NASA.

5.6 1-Year Goals

5.1 Decide on a common storyboarding approach for the Agency's major PAT's and reinvention labs (QST; August 1994).

5.2 Forecast QMB's and major PAT's and reinvention labs for FY 95 and estimate their resource requirements (QST; September 1994).

5.3 Begin the streamlining of NASA's procurement process by participating in Governmentwide electronic commerce initiatives (Code H; September 1994).

5.4 Develop a systematic method for prioritizing and selecting processes for improvement and forecasting resource requirements (QST; December 1994).

5.5 Make satisfactory progress toward eliminating at least 50 percent of NASA's internal regulations, consistent with EO 12861, especially those that constrain process improvement/development (Code J; ongoing to April 1995).

5.6 Identify at least one critical process for improvement using a continual improvement approach (Each Strategic Enterprise and Strategic Function; April 1, 1995).

5.7 Develop a mechanism for involving customers and suppliers in improving process quality (Customer Standards Steering Group; April 1, 1995).

5.8 Expand NASA's reinvention laboratory initiative by adding at least one laboratory (Code T; April 1995).

5.9 Integrate the NASA RMIS and the CI Plan into one plan and tracking system (QST, Code T; April 1995).

6.0 SUPPLIER QUALITY

6.1 <u>Purpose</u>

The practice of continual improvement by NASA's suppliers and NASA's partnerships with its suppliers are both critical to achieving customer satisfaction. Over 85 percent of NASA's budget goes to external suppliers, so NASA's effectiveness is heavily dependent upon the total quality of its suppliers. The term "suppliers" includes the contractor community, both prime and subcontractors, and other organizations that supply NASA with services and products (e.g., other government agencies). NASA's major suppliers are defined by the I/O analysis (See chapter 1). This chapter describes the process for defining supplier requirements and ensuring and improving the total quality of products and services furnished to NASA.

6.2 <u>Quality Requirements</u>

Quality requirements for goods and services and the agreement to deliver them will be the result of high-quality contracts, memoranda of understanding, and partnerships between NASA and its suppliers. Initiatives will include the following:

- Development of a database identifying and classifying NASA suppliers.
- Identification of the supplier/customer chain.
- Formulation of supplier-quality policies consistent with NASA's mission, values, and strategic management plan.
- Establishment of a NASA-wide supplier process and performance measurement system incorporating appropriate metrics.

NASA's goal is to improve its acquisition practices (e.g., requirements determination and procurement) to provide a clear picture of what is needed while giving suppliers freedom and financial incentive to be innovative and efficient. Emphasis will be put on methods that encourage prevention versus detection (e.g., concurrent engineering) and encourage subcontractors as well as contractors to use continual improvement.

6.3 <u>Communicating Quality Requirements</u>

The goals and expectations agreed to in the NASA/supplier partnership will be communicated to all NASA activities and suppliers in a systematic manner. The guidelines will address basic issues, such as:

- Use and application of national (e.g., Baldrige criteria) and international (e.g., ISO 9000) quality program standards and quality award criteria and measures.

- Flexibility to encourage NASA installations to augment and enhance their own continual improvement initiatives with respect to contractors.
- Incentives, motivation, and rewards to suppliers who implement internal continual improvement actions and introduce innovative quality initiatives to achieve customer satisfaction.
- Encouraging the application for, and use of, the Malcolm Baldrige National Quality Award and the George M. Low Award criteria as the basis for self-assessment of continual improvement.
- Joint participation in continual improvement and TQM forums, symposia, and conferences.

6.4 Partnership Development

A partnership is a working relationship between customer and supplier, based on use of continual improvement principles and tools. Nurturing partnership development requires shared understanding of each other's expectations and requirements; commitment to continual improvement of each other's products, services, and processes; and a cooperative attitude. Some of the key elements for developing and enhancing the NASA/supplier partnership are:

- Mutual involvement in early planning, design, and process development.
- Involvement of suppliers in setting up the communication, recognition, and reward systems.
- Consensus on the metrics used as indicators of performance achievements.
- Promoting the use of the Malcolm Baldrige National Quality Award and the George M. Low Award criteria for self assessment and internal organizational improvement.
- Accommodating the needs and requirements of small and small/disadvantaged business.

6.5 Key Quality Indicators and Performance Monitoring

Quality indicators are metrics mutually agreed upon by both the supplier and customer as measures of the total quality of the supplier's performance. Emphasis will be on indicators that allow for prevention of defects rather than after-the-fact detection. To provide indications and predictions of performance, NASA and its suppliers need to:

- Establish and implement the metrics to measure performance capability.
- Provide the mechanisms for continual feedback of results, assessment of progress, and accomplishments.

- Develop strategies for deployment of continual improvement initiatives and assess the effectiveness of continual improvement efforts.

Periodic evaluations of implemented systems, processes, and controls will provide a measure of accomplishments, a means to determine areas for improvement, and an identification of issues requiring corrective actions, especially future preventative actions.

6.6   1-Year Goals

6.1   Require consideration of performance-based contracting as a part of procurement planning (Code H; May 31, 1994).

6.2   Develop and distribute a continual improvement guidance document for use by small and small/disadvantaged businesses (Code K; November 1994).

6.3   Reach agreement between NASA and its suppliers concerning continual improvement metrics as part of the CMPAT effort (See chapter 2) (Codes H and T; December 1994).

6.4   Extend the use of cooperative agreements to "for profit" organizations (Code H; December 1994).

6.5   Publish guidance on the use of ISO 9000, based on new policy (Code Q; October, 1994). Educate key management personnel on ISO 9000 (Codes Q, T, and F; April 1995).

6.6   Conduct CI and Reinvention Conference to share continual improvement strategies and lessons learned and to celebrate successes (QST, Code T; April 1995).

6.7   Administer the first year of the reengineered George M. Low Award program as a vehicle for supplier self-assessment and recognition (Code T; April, 1995).

7.0 QUALITY AND OPERATIONAL RESULTS

7.1 Purpose

Assessing results involves measuring performance against goals, identifying opportunities for improvement, and analyzing customer-satisfaction predictors. This chapter provides a framework for routinely monitoring, assessing, and acting upon indicators of performance against key goals and objectives as specified in NASA's Strategic Plan and the Administrator's performance agreement and consistent with GPRA requirements.

7.2 Defining Excellent Performance

Customer requirements translate into goals and objectives, which are further translated into performance indicators. First and foremost, performance must be judged as excellent by the customer (See chapter 8). Second, every factor deemed critical to product and service quality must be within specifications or meet certain goals. Proof of excellent performance will include historical data that show trends and measures of process improvement.

7.3 Performance Measures

Agencywide Performance

The major method of Agencywide assessment of performance is being developed by the NASA MPAT and administered by the Office of Continual Improvement. It provides NASA's managers and customers critical information to support performance assessment relative to the goals and objectives stated in the NASA Strategic Plan, which is based on Strategic Enterprises, Strategic Functions, and Operating Principles.

Accordingly, the performance measurement system will collect and present data in the following categories and subject areas:

- A. Strategic Enterprises and NASA Program Management

    1. Program Management Council (PMC) Outcomes
    2. Strategic Enterprise Performance
        - Mission to Planet Earth
        - Aeronautics
        - Human Exploration and Development of Space
        - Scientific Research
        - Space Technology
    3. Innovations and Discoveries

B. Strategic Functions

    1. Physical Resources
    2. Human Resources
    3. Space Communications
    4. Transportation to Space

C. Operating Principles

    1. Educational Outreach
    2. Small and Small/Disadvantaged Business Utilization
    3. Equal Opportunity and Diversity
    4. International Cooperation
    5. Procurement/Acquisition
    6. Environmental Stewardship
    7. External Review
    8. Public Information
    9. National and Community Service
    10. Continual Improvement
    11. Budget and Financial Management
    12. Ethics and Standards of Conduct
    13. Safety and Mission Assurance

Leaders of the Strategic Enterprises, Strategic Functions, and Operating Principles are responsible for developing their own information systems to collect, validate, and evaluate performance data addressing their products, services, and processes. All leaders will review their specific performance data and select appropriate performance measurements for their areas.

These metrics will also help NASA meet the GPRA requirements. Specifically, they will provide the foundation for the development of NASA's annual performance plans and reports as required by GPRA.

The QST has initiated a biannual external assessment of the Agency's progress in continual improvement (See chapter 3).

The NASA RMIS tracks implementation progress against the requirements of the NPR. This information becomes the basis for NASA reports to the White House and the Agency's input into the annual Governmentwide NPR status report.

NASA's suppliers are key elements of the Agency's ability to achieve excellent performance. As such, a separate system has been established to gather and assess metrics from selected contractors in the areas of cost, schedule, technical, award fee, subcontracting plan, and continual improvement (See chapter 6). Using existing data groups, staffed through

the Program Offices, NASA's largest contracts will be reviewed semiannually to measure progress in key program performance areas. This system will be incorporated into the Agencywide metrics system.

Organizational Performance

In addition to the above overarching performance measures, organizations will also evaluate how well the products and services for which they are responsible meet customer needs or requirements. Each organization will assess the performance of the systems and processes implemented to ensure that they effectively and efficiently produce intended outputs and outcomes. The focus will be on quantitative and qualitative measures of productivity and effectiveness. All measures will relate directly to product and service quality with the ultimate goal of customer satisfaction. This process will also help organizations identify processes and systems that may be candidates for process improvement team focus activity or reenginnering (See chapter 5).

Traditional indicators of performance that will be reviewed include cost, schedule, technical quality, cycle time, productivity, employee satisfaction, supplier performance, and continual improvement. However, emphasis will be placed on developing other, more state-of-the-art indicators, such as design quality and requirements quality.

7.4   Results Reporting

Results reporting and assessment, including the Agencywide performance measurement report, will be carried out with a structured, unified, and disciplined approach. Such an approach will ensure that all the key performance factors for the Agency have been identified and reported and, therefore, subjected to a quality improvement review. A unified approach will provide for a recognizable form of reference among the diverse installations within NASA. Results reporting is to be used as a basis for improvement action, not as a "report card" or as judgment of performance.

A complete reporting format will include:

- Overview of Metric. This should include reasons for measurement; relationship to NASA mission, goals, objectives, background; and the way data are used by management.
- A performance objective for the area being measured. For each performance or process measurement, a performance objective or goal will be developed.
- Definitions of key terms used in the measurement activity.
- A description of the data and measurement.
- A graphical display of the results.

- Assessment of Indicators. This should include historical trends and an overall narrative summary of current performance with comparisons to established goals, comparisons with other Agencies, comparisons to "benchmarks", and highlights.
- Proposed corrective actions, as required.

The results data will be shared with NASA's management, workforce, customers, and suppliers. The Agency composite of performance measurements will be produced twice a year; in September for internal evaluation purposes and in March for external release. The March report will be used to produce the Annual Performance Report required by GPRA.

7.5 1-Year Goals

7.1 Track trends of the 10 metrics identified in the HQ MPAT initiative and report FY 94 results to the SMG (report may include additional areas) (MPAT; April 1995).

7.2 Integrate the Contractor Metrics package into the Agencywide metrics package (MPAT, Code H; April 1995).

7.3 Use the NASA RMIS to track NASA reinvention initiatives, including Agency responses to the NPR reports and subsequent Executive orders, Presidential memoranda, and legislation (COO, QST, Code T; ongoing to April 1995).

8.0 CUSTOMER FOCUS AND SATISFACTION

8.1 Purpose

Customer satisfaction is the prime indicator in determining NASA's degree of success. Customer satisfaction is reached by developing and maintaining a clear understanding of NASA's customers--their needs, expectations, and requirements. Frequent measurement of customer satisfaction provides objective feedback on which to base decisions to improve customer satisfaction. Creating an organizational culture that focuses on NASA's external and internal customers, their organizations and employees, is critical to the continual improvement success of NASA. This chapter presents NASA's approach to its customers, including NASA's implementation of EO 12862, "Setting Customer Service Standards."

8.2 Understanding Customer Requirements and Expectations

Identifying Customers

The NASA Strategic Plan provides the framework to identify unique customer groups and associated requirements through the Strategic Enterprises and Strategic Functions.

The Strategic Enterprises represent the mission of NASA. They identify, at the most fundamental level, what the Agency does and for whom. Just as each Enterprise has a specific set of goals and objectives, each also has a specific set of customers. Additionally, selected staff offices serving crosscutting customers, such as public affairs and legislative affairs, also serve external customers. In the broadest sense, NASA's customer is the U.S. taxpayer who pays for NASA programs and, therefore, must benefit from them. More specifically, there are intermediate customers who receive NASA's products and services, then use them to create public benefit directly. NASA's external customers range from the Administration and Congress to the science and education community, aerospace and nonaerospace industries, and other Federal Agencies.

NASA's Strategic Functions are generally internally focused to serve and assist the Strategic Enterprises meet their external customers' needs. Customers internal to NASA include the various program, policy, and staff offices; the 10 NASA installations; and all NASA employees.

Agency customer groups will be identified by the QST and respective Strategic Enterprises and Functions through a methodical I/O analysis of Agencywide supplier/customer chains (See chapter 1).

Defining and Communicating Requirements and Expectations

As stated in the NASA Strategic Plan, NASA is committed to satisfying external customers' needs. As a first step, the QST created a "Customer Standards Steering Group" to identify the Agency's crosscutting customers and also to assist and coordinate efforts by the Strategic Enterprises Functions to survey their external customers. The Customer Service Standards Steering Group is developing an implementation plan for EO 12862, "Setting Customer Service Standards," which outlines requirements for setting customer service standards and achieving customer satisfaction.

Customer needs, requirements, and expectations, based upon data from the customer, will be communicated through formal and informal forums, with the primary flow of information gathered and disseminated through the Strategic Enterprises and Functions. For example, each Strategic Enterprise and Function will interact with its specific customers through focus groups and customer surveys to determine their wants and needs. The Strategic Enterprises and Functions, in order to act upon customer data, will develop mechanisms to promote open communication, feedback loops, and opportunities to interface with both the internal and external customers, as appropriate. The analysis of this information will be used to set standards and judge the satisfaction being achieved by defined products and services. In general, employees will work closely with customers to meet and exceed customer-service standards.

8.3 Changing the NASA Culture

It is important to link NASA performance to customer requirements. NASA's delivery of products and services needs to be seen as being paramount to achieving Agency success. Surveys of NASA employees concerning their understanding of the needs and satisfaction of both internal and external customers will provide both the employees and management with new foundations upon which to design training, implement process improvements, and attain overall Agency excellence. A systematic review of delivery systems and comparisons with process improvement successes from best-in-class organizations will provide benchmarks for continual improvement of NASA's customer satisfaction approaches.

To bring about this cultural change, NASA must better understand its customers. Each Strategic Enterprise and Function will focus on customers and understand their requirements and expectations by:

- Educating employees as to who their customers are.
- Helping employees understand what it means to engage in "customer-focused" behaviors.

- Internally monitoring processes as they relate to customer satisfaction.
- Encouraging collaboration and cooperation within the organization to focus on the value provided to the customer.
- Examining policies and practices which impede customer satisfaction and modifying them accordingly.
- Expanding and improving on policies and practices which result in increased customer satisfaction.

8.4 Measuring Customer Satisfaction

The collection of objective customer-derived data is critical to understanding the level of customer satisfaction being achieved. Methods used to gather satisfaction data from specific customers are influenced both by whether the customer is the immediate, the intermediate, or the ultimate customer, and also by whether the data are being collected directly from the customer upon receiving a product or service, or at a later date. Data collected at a later time are used to search for long-term effects or to obtain general feedback on broad programs, functions, and services.

Ensuring the reliability and validity of the data collected from customers are critical issues when designing customer-survey instruments or developing other methods to collect customer data.

In developing plans to measure and respond to customer satisfaction, consideration should be given to developing methods that allow for a periodic building-block approach to measurement. For example, an initial survey might focus on overall satisfaction levels and follow-up surveys or focus groups would focus on specifics for areas of low satisfaction.

Some methods of collecting customer data include:

- Written surveys
- Evaluation forms
- Focus groups
- Interviews
- Polls

Benchmarking (See chapter 2), NASA reviews and studies, and formal independent reviews of the Agency by groups chartered by both internal and external organizations can provide independent analyses of customers' perceptions of the Agency. Also, the relevance and meaning of the concept of "competitors" will be considered and used, as appropriate. Trend analysis will be used to document changes in customer satisfaction over time. Both current and trend data on customer satisfaction will be included in the NASA Metrics Program being created by the MPAT (See chapter 2).

33

As NASA's customer satisfaction is measured, the data developed will provide the guidance to continually improve the Agency's ways of doing business. From data provided from customer satisfaction measurements, NASA will develop specific improvement actions. Best-in-class performance is NASA's goal.

8.5   1-Year Goals

8.1   Provide the President a comprehensive Customer Standards Plan, as required by EO 12862, "Setting Customer Service Standards" (QST, Customer Standards Steering Group; August 25, 1994).

8.2   Develop plans to identify key customers, establish customer service plans and standards, and measure customer satisfaction against the standards (QST, Strategic Enterprises, selected Strategic Functions and staff offices serving crosscutting customers; April 1, 1995).

8.3   Survey a segment of key customers to determine their level of customer satisfaction. (Strategic Enterprises, selected Strategic Functions, and selected staff offices serving crosscutting customers; April 1, 1995)

Appendix A

QST Charter

QUALITY STEERING TEAM CHARTER

MISSION:

The mission of the NASA Quality Steering Team (QST) is to guide NASA's continual improvement (CI) by developing quality policy and plans, administering those plans, continually assessing progress toward achieving plan goals and setting new standards to facilitate the continual improvement philosophy.

SCOPE:

The QST will develop policies and plans which pertain to the NASA Team. The NASA Team encompasses NASA, its stakeholders, suppliers, and customers.

RESPONSIBILITIES:

The QST will be responsible for putting into place continual improvement policies and programs which support the desired change. In recognition of management's responsibility to manage the organization as a system and to improve interactions across organizational components, the OST will focus the plan on efforts to improve cooperation and systems integration across all organizational components to achieve NASA's vision and mission. This includes education and training; rewards and recognition; process measurement and improvement; supplier relationships, and customer relationships. This responsibility also entails ensuring, through line management, that these programs are adequately supported with the necessary resources.

The QST will develop and deploy policies and plans within its scope. This includes providing guidance to the Headquarters' Continual Improvement Council (CIC), Quality Management Boards (QMBs), Center quality councils or similar boards, and cross-functional Process Action Teams (PATs).

MEMBERSHIP:

The QST will be comprised of approximately 15 members from the Senior Management Group. Permanent members are the Administrator, who will serve as the Chair, Deputy Administrator, Chief of Staff, Associate Deputy Administrator, Associate Administrator for Human Resources and Education, and Associate Administrator for Continual Improvement, who will also serve as Executive Secretary. Rotating membership will be distributed among Senior Management Group members of the Administrator's staff, Associate Administrators for program offices, Associate/Assistant Administrators for policy offices, and Directors of Field Installations.

OPERATING PRINCIPLES:

The QST will operate in accordance with CI principles. No substitutes will be allowed. Meetings will be held monthly and, to the extent feasible, in conjunction with Senior Management Group meetings. All members of the Senior Management Group are welcome to attend the QST meetings.

DEC 7 1992

Daniel S. Goldin   Date
Administrator

A-1

Appendix B

Acronyms

ACRONYMS

CI	Continual Improvement
CMPAT	Contractor Metrics Process Action Team
COO	Chief Operating Officer
CQA	Code Quality Advisor
EO	Executive Order
E&TQMB	Education and Training Quality Management Board
FQI	Federal Quality Institute
GPRA	Government Performance and Results Act
I/O	Input/Output
MPAT	Metrics Process Action Team
MSA	Metric Subject Area
NASA	National Aeronautics and Space Administration
NPR	National Performance Review
PAT	Process Action Team
PDSA	Plan, Do, Study, Act
PM	Presidential Memorandum
PMC	Program Management Council
QMB	Quality Management Board
QST	Quality Steering Team
RMIS	Reinvention Management Information System
SES	Senior Executive Service
SMG	Senior Management Group
SPC	Statistical Process Control
TQM	Total Quality Management

Appendix C

Glossary

GLOSSARY

Baldrige Award: The Malcolm Baldrige National Quality Award, established by Congress in 1987, is our country's award to U.S. companies that excel in quality management and quality achievement. The Baldrige award criteria are widely used to assess an organization's progress toward achieving excellence.

Benchmarking: The process of continually comparing and measuring an organization's products, services, and practices against those of world-class business and Government organizations to gain information on improving performance.

Best Practices: Organizational actions or methods proven to be most likely to produce quality performance. Best Practices are often collected and shared among groups or organizations to facilitate continual improvement.

Common Causes: Those sources of variation that are inherent in the process over time and which affect all outputs of the process.

Concurrent Engineering: A systematic approach to the integrated design of products and their related processes, including manufacturing and support. This approach is intended to cause the developers, from the beginning, to consider all elements of the product life cycle, from conception through disposal, including quality, cost, schedule, and user requirements.

Continual Improvement (CI): A philosophy, set of guiding principles, and set of methods and tools for applying quantitative methods to improve performance and optimize the total organizational system to meet its mission, including materials and services supplied to the organization, all processes within the organization, and the degree to which customer needs are met. It is referenced throughout the world by many terms, such as Total Quality Control (TQC), Total Quality Management (TQM), Total Quality Excellence (TQE), and Total Quality Leadership (TQL).

Cross-functional Team: A group of individuals from different organizational units or functions who are part of a team formed to solve problems, plan and develop solutions, or recommend process improvements affecting the organization as a system.

Customer: Any organization, group, or individual who receives products or services.

> **-internal:** The customer is in the same organization as the supplier.
> **-external:** The customer is outside the supplier's organization.

Cycle Time: The elapsed period between the beginning and completion of an operation.

Empowerment: A conscious management decision to share power, delegate authority, and provide resources and skills to enable employees to make decisions on delivering improved products and services to the customers they serve.

Facilitator: A person specially trained to function as a coach or moderator for a group, team, or organization. In a typical team, the facilitator focuses on process while the team leader focuses on content. Sometimes, facilitators also fulfill the additional roles of instructor and technical consultant.

Flowchart: A graphic, structured representation of the steps in a process.

Input/Output Analysis (I/O Analysis): The process of identifying suppliers, inputs, processes, outputs, and customers in order to define the organizational system and its boundaries.

Integrated Product Team: A group of representatives from functional disciplines using the concurrent engineering approach to integrate and simultaneously apply all necessary processes and functional disciplines to produce an improved product or service that satisfies customer needs. The purpose is to optimize the overall product or service, i.e., minimize total life-cycle costs.

Integrated Systems Approach: An approach to management which treats the organization as an open system and works toward optimizing the overall performance of the organization to achieve its purpose or mission.

ISO 9000: A set of standards developed, coordinated, and approved by the international standards community, are a set of tools to be used for implementing the quality assurance process for products or services with the broad objective of satisfying customer desires through quality management.

Kaizen: "Kaizen means improvement. Moreover, it means continuing improvement in personal life, home life social life, and working life. When applied to the workplace, Kaizen means continuing incremental improvement involving everyone-- managers and workers alike." (Kaizen Institute)

Loose-tight Organizational Model: A model of organizational functioning in which certain functions are highly centralized while other functions are highly decentralized.

Metric: A measurement, taken over a period of time, that communicates vital information about a process or activity and drives appropriate leadership or management action. A metric package consists of an operational definition, measurement over time, and presentation.

Operational Definition: A definition that gives communicable meaning to a concept by specifying the manner in which the concept is measured and applied within a particular set of circumstances. It is composed of three elements--criterion, test, and decision. The operational definition will change, depending on the application.

PDSA Cycle: Also known as the Shewhart cycle, it is a structured, cyclical methodology for developing and implementing actions of any type--_Plan_ by collecting and analyzing baseline data and developing alternatives; _Do_ by implementing the selected alternative (preferably on a small scale); _Study_ by evaluating results and comparing expected outcomes; _Act_ by standardizing action and/or starting over. It is the scientific method to improving and process or system.

Process: A set of interrelated work activities that are characterized by a set of specific inputs and tasks that produce a set of specific outputs.

Process Action Team (PAT): A group of individuals who are knowledgeable about a selected process and are chartered by senior leaders or process owners to analyze and improve the target process, using the PDSA cycle and other associated formal analytical techniques.

Process Improvement: The continuous endeavor to improve a selected process, reduce variation and complexity, and better align the process to match the voice of the customer (i.e., customer requirements).

Process Owner: The person who coordinates the various functions and work activities at all levels of a process, has the authority or ability to make changes in the process as required, and manages the process to ensure optimal performance.

Quality: The result of consistently meeting, exceeding, and anticipating customer expectations regarding a product or service which includes effective operations of processes required to create and deliver those products and services.

Quality Function Deployment (QFD): A method for designing products or services based on customer requirements involving all necessary functions of the producing organization.

Quality Management Board (QMB): A cross-functional group of midlevel managers who are jointly responsible for a subsystem (i.e., group of processes) or product or service area. The QMB's function is to charter PAT's and perform as the guidance team for these PAT's.

Quality Steering Team: A group of NASA's senior managers who are collectively responsible for the quality transformation and reinvention of NASA--NASA's executive steering body for continual improvement.

Reengineering: An approach to dramatically redesigning critical processes.

Root Cause: The basic reason for nonconformance within a process. When the root cause is removed or corrected, the noncomformance will be eliminated. It is to be contrasted with symptoms of problems which, when removed, do not create permanent process improvements.

Special Causes: The sources of variation that are not always in the process or do not affect every product or service, but arise because of specific circumstances. Sources of variation that are unpredictable or unstable.

Statistical Control: The condition describing a process from which all special causes of variation have been eliminated and only common causes remain, evidenced on a control chart by the absence of points beyond the control limits and by the absence of nonrandom patterns or trends within the control limits.

Statistical Process Control (SPC): The application of statistical techniques for measuring, analyzing, and improving the quality of products or services by reducing process variation.

Storyboarding: A technique to graphically display the methodology used and progress made by a PAT.

Supplier: Any organization, group, or individual which provides products or services to customers.

System: Three or more entities which affect one another and can be taken apart. The performance of a system is never the sum of the performances of its parts taken separately: it is the product of its interactions.

Variation: The observed difference in output characteristics produced by a process.

Voice of the Customer: Communication of the customer's expectations and requirements for a product or service.

Voice of the Process: The actual output of a process.

This Glossary was developed by the staff of the Office of Continual Improvement to assist the readers with definitions. It will be revised and expanded in future versions of the CI Plan.